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ABSTRACT

During the 1985-86 school year, 16 North Carolina school units began a four-year pilot program that used a variety of incentives, evaluation strategies, and staff development activities to improve teachers' skills, and, indirectly, the achievement of students. After three years of the Career Development Program (CDP), the California Achievement Test scores of students in the school units were analyzed to see if their teachers' career development program made a difference. A control group of 15 units comparable to the CDP group also was analyzed in order to clarify which effects might be attributable to career development. The test showed more improvement in the CDP units than in the match units. For example, at grades 3, 6, and 8, the number of CDP units scoring below the national median declined, whereas most match units continued to have scores below the median. In addition, more than 63 percent of the CDP units experienced growth in each grade over the period, whereas in the match units, the corresponding percentage never exceeded 50 percent. Improvements in achievement were more widespread in the CDP units. Finally, sixth-to-eighth grade scores improved for the CDP units more than for the control units. The study concluded that the CDP units' students appear to have made more substantial gains faster than did other students in their region and state. (KC)

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STUDENT ACHIEVEMENT IN CAREER DEVELOPMENT

PROGRAM PILOT UNITS, 1985-88

EXECUTIVE SUMMARY

In school year 1985-86, sixteen North Carolina school units agreed to participate in a four-year pilot program intended "to attract and retain the best people to education". Using a variety of incentives, evaluation strategies, and staff development activities, the Program hoped to improve teachers' skills and, indirectly, the achievement of students. This report analyzes the students' achievement in Grades 3, 6, and 8 over the three years that the Program has been in place. Using unit averages from the California Achievement Test Total Battery, we will analyze these students' performance.

In order to clarify which effects might be attributable to Career Development, a second group of achievement scores will be examined. A match group of 15 units that are comparable to the CDP group on four dimensions was created. The four variables are average daily membership, per-pupil expenditure (excluding school food service), percentage of students planning to attend college, and geographic location in North Carolina. By comparing this group's achievement to that of CDP units, patterns of improvement will be seen in CDP units that in the match units are more randomized and generally less positive.

Essentially, the analysis found the following:

- At Grades 3, 6, and 8, the number of CDP units scoring <u>below</u> the national median <u>declined</u>. In the match units, the number declined only for Grade 3. In fact, the number of units <u>below</u> the median in Grade 6 <u>increased</u>.

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- More than 63% of the CDP units experienced growth in each grade over the period. In the match units, the corresponding percentage never exceeded 50%.
- Improvements in achievement were more widespread in the CDP units, affecting low-achieving and high-achieving units. By comparison, while low-achieving match units often made gains, high-achieving units often lost ground.
- If the 1986 6th graders' performance is compared to their performance two years later (1988 8th grade), we see gains in both the CDP and the match units among the lowest scoring sixth grades. However, match units in the middle and upper range were more likely to decline in achievement, and more likely to show larger declines than CDP units.

When compared on virtually any measure, CDP units, individually and as a group, experienced more positive change in student achievement than did the matched unit While North Carolina's students generally improved over the period, the CDP units' students appear to have made more substantial gains faster than did other students in their region and state.

STUDENT ACHIEVEMENT IN CAREER DEVELOPMENT PLAN PILOT UNITS, 1985-1988

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INTRODUCTION

In school year 1985-86, sixteen school units launched a pilot program designed to attract and retain good educators. While improved instruction and consequently improved learning were clearly goals of the pilot program, the interventions directly affected teachers, not students. Whereas curriculum changes directly influence, or seek to influence, the learner, the Career Development Program aims at instruction - or teacher behaviors - as the locus of change. While the effect on student achievement is desired, it is not directly traceable to CDP features.

This indirect relationship between strengthening instruction and strengthening student performance is further complicated by the fact that the specific teacher behaviors that are encouraged are themselves correlative, not causal, of improved student achievement. In the research that underlies North Carolina's performance appraisal system, all of the teaching skills are correlated powerfully with student achievement gains. It is, therefore, reasonable to ask: What effects has the Career Development Program pilot had on student achievement in the 16 participating districts? This report seeks to answer that question.

Frankly, we undertake this analysis with some reluctance. Throughout the pilot period, superintendents, principals, and teachers have reported almost universally that teaching has improved and that student performance has improved. In 1986, we reported that 57% of more than 4,000 teachers responding to a DPI survey agreed that "participating in the CDP has helped me perform my role more effectively". (N. C. Board of Education, 1986). Only 31% of respondents disagreed with the statement.

In addition, 43% of respondents agreed that Effective Teaching Training and the new evaluation system had improved the quality of instruction in their schools. An additional 28% weren't sure. Even at that early date, 41% of respondents agreed that the Career Development Plan was likely to influence education in a positive way. Of all respondents, only about one-third (36%) disagreed with that statement.

Moreover, in a survey conducted by the North Carolina Association of Educators at about the same time (NCAE, 1986), 37% of respondents felt they had become better teachers and that classroom instruction had somewhat improved. Another 13% felt that they had definitely become better teachers. A quarter felt there had been no change, and only 17% felt classroom performance had suffered. As recently as Spring, 1988, in a second NCAE survey, (Bunche, 1988) 58% of the respondents agreed that "lessons based on the 6-step lesson plan have improved student learning", while 64% agree that "observation and evaluation have helped me to improve specific aspects of my teaching".

Our reluctance does not stem from any fear that student achievement has suffered because of the Career Development Program pilot. Rather, we hesitate to conduct the analysis because of the complex interaction between teacher in-puts and student outcomes. Teaching and learning are far too complex to reduce to a single number. Much of what is taught and learned goes untested. That is in the nature of evaluations which are per force limited in what can be measured.

Moreover, students experience far more than is taught by teachers. Put another way, teachers exercise too little control over all their students' experience for student achievement tests to be valid in discovering the relationship between any single teacher's efforts and any single student's achievement. However, if we consider unit average test scores, and if we consider this analysis as programmatic evaluation, much of the difficulty disappears.

We will still not factor out all the interference between teaching and learning, but by aggregating the data at the unit level and then comparing units, we will gain a useful sense of change in performance. Moreover, if we find trends or patterns in the data, these will be highly suggestive. With these limitations in mind, then, we proceed to the actual analysis of the data. We do not believe that these data will indicate causal relationships between Career Development effects and student achievement. We do, however, believe that we will see correlations between participation in Career Development and improved student achievement.

We cannot attribute all positive change to Career Development, but, if we fail to discover similar patterns of achievement in a matched sample of students, then clearly some effect of Career Development is present and is influencing students' achievement.

METHODOLOGY

In order to assess the impact of Career Development on student achievement, we analyzed the results of the California Achievement Tests (CAT), which are administered annually to children in North Carolina's public schools. Because of the availability of data, we focused on the performance of children in Grades 3, 6, and 8 during school years 1985-86, 1986-87, and 1987-88. (Div. of Research, 1986). Because the CAT was re-normed in 1985-86, comparisons prior to the pilot period were not attempted. We also collected and analyzed performance data for youngsters in 15 additional units. We hoped, by using these comparison analyses, to be able to isolate patterns in the performance data that could not be attributed to chance, to other reform efforts -- most notably the Basic Education Program and the Standard Course of Study -- that have been undertaken in North Carolina schools, nor to other causes than CDP. The match units were selected by Dr. Carol Furtwengler of the Research & Service Institute of Nashville, Tennessee. Dr. Furtwengler is the third-party evaluator retained by the N. C. General Assembly to study CDP implementations. She selected the match units on the basis of geographic distribution, average daily membership in the match units, per-pupil expenditure (excluding school food service), and percentage of students planning to attend college. (Private communication from Carol Furtwengler, 1988). Thus, Dr. Furtwengler constructed a mirror-image of the CDP pilot units. Similarities and differences in performance profiles in the pilot and match units should, therefore, allow us to draw some tentative conclusions about the effects of Career Development. Since the match units did not voluntarily participate in this study, we will refer to them by letter (District A, etc.) in order to avoid any hint of criticism of the performance of their students or teachers. (Research and Testing Services, 1987, Division of Testing, 1988).

RESULTS

The CAT scores for third grade students in the pilot units are presented in Table 1. For convenience, we have selected the median national percentile average on the total battery for each unit as our reported figure. For each year, we have arranged the units in rank order, followed by the unit's average score. The number in parentheses following the 1987 score indicates the amount of change. Following the 1988 average, we present two numbers in parenthesis. The first shows the change between 1987 and 1988. The second indicates the amount of change between 1985-86 and 1987-88, the entire pilot period. The plus sign (+), of course indicates gain, while the minus (-) indicates loss. The dark line within the columns separates units scoring above the 50th percentile, or national average, from those units scoring below the national average.

Grade 3 Results

Examination of Table 1 makes several things clear. First, the number of units scoring below the 50th percentile declined steadily over the period from four to two to one in 1987-88. Moreover, both the ceiling (highest score) and floor (lowest score) rose over the period, when the units are taken as a whole. For individual units, the averages increased in 12 units over the period, remained unchanged in one unit, and declined in three units. In the units experiencing decline over the period (Roanoke Rapids, Harnett, and Mecklenburg), however, two of them had improved over their 1986-87 performance.

The gains made by the four units performing below the 50th percentile in 1985-86 should not be overlooked. With only one exception, these units all moved up significantly over the period, with Perquimans registering a dramatic 22 percentile point increase.

TABLE 1

3rd Grade CAT Scores (Unit Average) for CDP Units

1986		1987		1988	
Burlington	76	Burlington	73 (- 3)	Burlington	77 (+ 4;+ 1)
Haywood	71	Tarboro	70 (+ 9)	Haywood	71 (+ 3;N.C)
R. Rapids	67	R. Rapids	68 (+ 1)	Alexander	71 (+12;+12)
Buncombe	67	Haywood	68 (- 3)	Perquimans	70 (+ 8;+22)
Harnett	64	N. Hanover	67 (+ 6)	Burke	69 (+ 6;+ 5)
Burke	64	Buncombe	65 (- 2)	N. Hanover	68 (+ 1;+ 7)
N. Hanover	61	Burke	63 (- 1)	Buncombe	68 (+ 3;+ 1)
Tarboro	61	Perquimans	62 (+14)	Tarboro	67 (- 3;+ 6)
Mecklenburg	60	Alexander	59 (N.C.)	R. Rapids	63 (- 5;- 4)
Orange	59	Montgomery	59 (+ 7)	Orange	62 (+ 5;+ 3)
Alexander	59	Mecklenburg	57 (- 3)	Harnett	60 (+ 4;- 4)
Montgomery	52	Orange	57 (- 2)	Mecklenburg	58 (+ 1;- 2)
Perquimans	48	Harnett	56 (- 8)	Montgomery	56 (- 3;+ 4)
Greene	47	Salisbury	52 (+ 8)	Greene	55 (+ 9;+ 8)
Salisbury	44	Greene	46 (- 1)	Chowan	50 (+11;+ 7)
Chowan	43	Chowan	39 (- 4)	Salisbury	47 (- 5;+ 3)

Moreover, whereas only two units scored above the 70th percentile in 1986, by 1988 four units had moved into this range. Put another way, units in all parts of the range were improving performance. Table 2 shows the difference per year in the range of scores and the distribution of units to deciles.

In summary, then, 75% of the CDF units' showed improvements over the period, in performance of 3rd grade students, while 19% of the units showed decline, with one unit remaining unchanged. Overall, both high-and low- achieving units experienced improvement, with only one unit remaining below the 50th percentile at the end of the period. Tables 3 and 4 display the same information relative to the match units. It is clear that achievement in the match units, as a group, is somewhat lower than the pilot units throughout the period. Four of the match units are below the 50th percentile in 1985-86 and 1986-87, while three remain below the 50th percentile in 1987-88. All three of these units have been below the 50th percentile throughout the period, although the floor rises from the 31st to the 35th percentile. Moreover, the ceiling rises dramatically from 64 to 72, but this is the result of the spectacular gain of Unit L, which moved from 49 to 72. The natural ceiling rises only to 68th percentile, a steady but not spectacular increase.

Overall, eight units witnessed improvement in 3rd grade, while seven experienced declines. The four units that began below the 50th percentile all experienced gains but, except for Unit L and to a lesser degree Unit M, the gains were slow and uneven. Two of the four, for example, experienced decreases in 1988 from 1987 levels. As Table 4 shows, the range increased over the period, indicating that growth at the top is occurring faster than growth at the bottom of the group. However, if we correct for Unit L, there is no change in the size of the range.

TABLE 2

Range and Decile Distributions of CDP Units Per Year

	Range	Deciles : Units
1986	43 - 76 (33 points)	30th: 0; 40th: 4; 50th: 3; 60th: 7; 70th: 2
1987	39 - 73 (34 points)	30th: 1; 40th: 1; 50th: 6; 60th: 6; 70th: 2
1988	47 - 77 (30 points)	30th: 0; 40th: 1; 50th: 4; 60th: 7; 70th: 4

TABLE 3

3rd Grade CAT Scores (Unit Average) for Match Units

1986		1987	1988
A*	64	C 66 (+ 3)	L 72 (+10;+23)
B	64	D 65 (+ 4)	C 68 (+ 2;+ 5)
C	63	B 62 (- 2)	J 66 (+ 7;+11)
D	61	L 62 (+13)	B 62 (N.C.;- 2)
E	60	J 59 (+ 4)	E 62 (+ 4;+ 6)
F	59	A 58 (- 6)	D 58 (- 7; -3)
G	58	E 58 (- 2)	M 57 (+15;+ 9)
H	57	H 56 (- 1)	A 57 (- 1;- 7)
I*	56	G 55 (- 3)	K 56 (+ 1;+ 2)
J*	55	K 55 (+ 1)	F 56 (+ 4;- 3)
K*	54	F 52 (- 7)	G 54 (- 1;- 4)
L	49	N 46 (+ 3)	H 54 (- 2;- 3)
M*	48	I 43 (-13)	I 45 (+ 2;-11)
N*	43	M 42 (- 6)	N 44 (- 2;+ 1)
O*	31	O 36 (+ 5)	O 39 (- 1;+ 4)

* Units participated in IPAS Pilot (1985-87)

TABLE 4

Range and Decile Distributions of Match Units Per Year

	Range	Deciles : Units
1986	31 - 64 (33 points)	30th: 1; 40th: 3; 50th: 6; 60th: 5; 70th: 0
1987	36 - 66 (30 points)	30th: 1; 40th: 3; 50th: 7; 60th: 4; 70th: 0
1988	35 - 72 (37 points)	30th: 1; 40th: 2; 50th: 7; 60th: 4; 70th: 1

In summary, then, the match units as a group show some of the tendency towards improvement seen in the CDP units. (See Figure 1). The growth, however, appears to be slower. As analysis of the individual units makes clear, the growth is also more randomized. While 75% of the CDP units experienced growth over the period, only slightly more than 50% of the match units experienced growth. Taken together, the match units show no clear patterns, unless one considers the fact that Units J, K, M, and O all experienced gains over the period and were involved in the DPI-sponsored pilot of the Teacher Performance Appraisal System in 1985-1987. The meaning, however, of this pattern is not clear, especially in view of the rather unfortunate performances of Units A and I, who also participated in the TPAS pilot.

Grade 6 Results

Tables 5 and 6 present the same information for Grade 6 in the CDP pilot units. Generally speaking, achievement test scores for 6th grade students are lower than they are for 3rd grade students for several reasons, mostly having to do with the greater curricular freedom experienced in Grades 4, 5, and 6 and the increased likelihood that the test and the curriculum will diverge. We see this phenomenon clearly in Table 5 as compared to Table 1. However, Table 5 shows similar patterns of achievement in other respects.

In 6th grade for CDP units, as for 3rd grade, we see that the number of units ending below the 50th percentile declines, although less dramatically. It is noteworthy, however, that the floor rises rapidly and steadily from the 33rd percentile to the 42nd. While the ceiling also rises from 69 to 71, it is interesting that in 1986 only three units were above the 60th percentile, but this number increases to 5 in 1988. Of the pilot units, 11 experience improvements over the period, one has no change, and four experience declines.

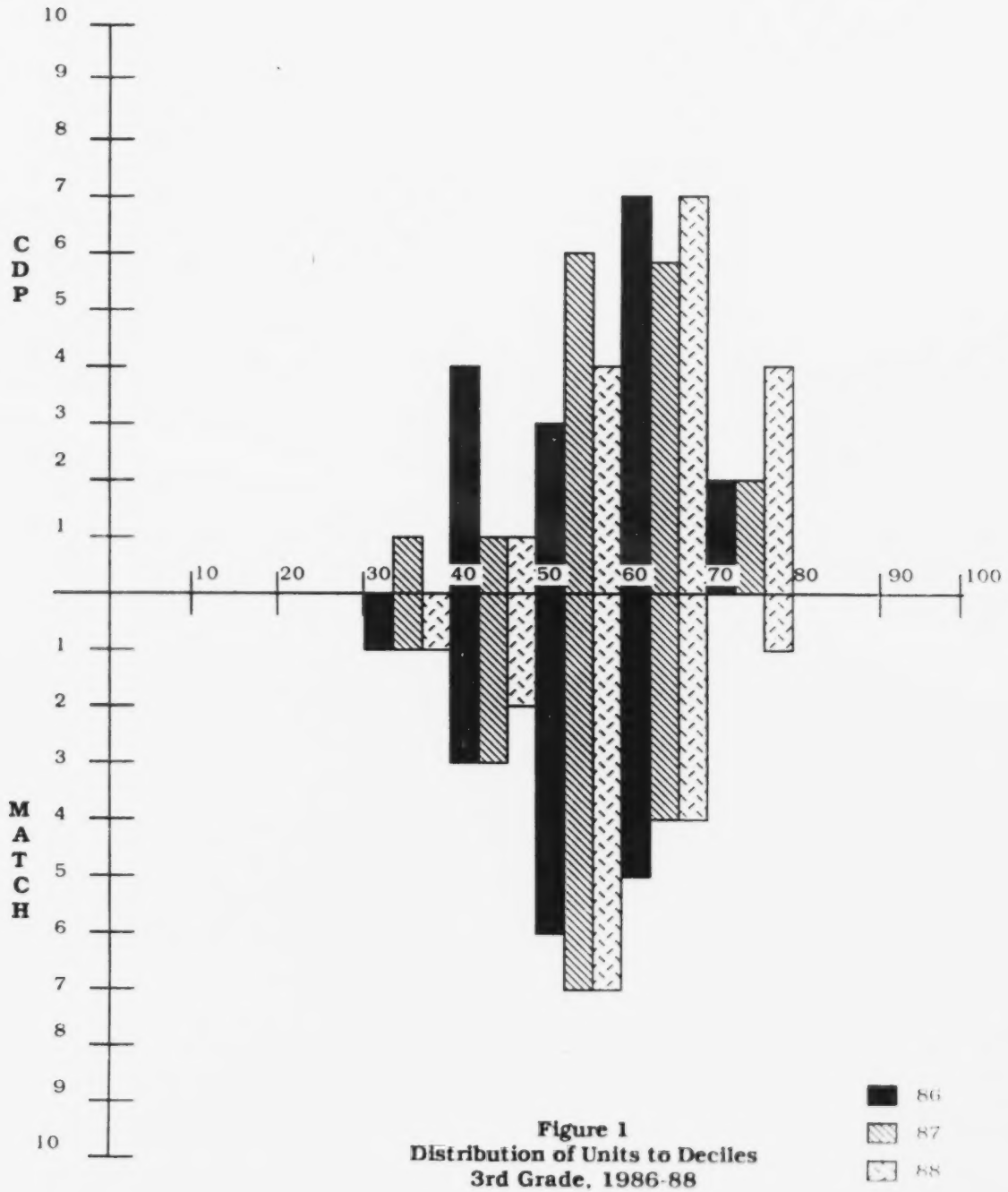


Figure 1
Distribution of Units to Deciles
3rd Grade, 1986-88

TABLE 5

6th Grade CAT Scores (Unit Average) for CDP Units

1986		1987		1988	
Burlington	69	Burlington	72 (+ 3)	Burlington	71 (- 1;+ 2)
Haywood	63	Haywood	66 (+ 3)	N. Hanover	66 (+ 4;+ 8)
R. Rapids	62	R. Rapids	65 (+ 3)	Buncombe	63 (+ 2;+ 5)
Burke	59	N. Hanover	62 (+ 4)	Burke	62 (+ 5;+ 3)
N. Hanover	58	Buncombe	61 (+ 3)	Haywood	62 (- 4;- 1)
Buncombe	58	Alexander	58 (+ 1)	Chowan	59 (+10;+ 5)
Mecklenburg	57	Burke	57 (- 2)	Alexander	57 (- 1;N.C.)
Alexander	57	Mecklenburg	55 (- 2)	R. Rapids	56 (- 9;- 6)
Chowan	54	Salisbury	54 (+16)	Mecklenburg	56 (+ 1;- 1)
Orange	53	Orange	54 (+ 1)	Orange	52 (- 2;- 1)
Harnett	50	Perquimans	53 (+ 8)	Harnett	51 (+ 2;+ 1)
Tarboro	48	Montgomery	50 (+ 6)	Montgomery	50 (N.C.;+ 6)
Perquimans	45	Tarboro	50 (+ 2)	Perquimans	50 (- 3;+ 5)
Montgomery	44	Chowan	49 (- 5)	Tarboro	49 (- 1;+ 1)
Salisbury	38	Harnett	49 (- 1)	Salisbury	42 (-12;+ 4)
Greene	33	Greene	39 (+ 6)	Greene	42 (+ 3;+ 9)

TABLE 6

Range and Decile Distributions of CDP Units Per Year

	Range	Deciles : Units
1986	33 - 69 (36 points)	30th: 2; 40th: 3; 50th: 8; 60th: 3; 70th: 0
1987	39 - 72 (33 points)	30th: 1; 40th: 2; 50th: 8; 60th: 4; 70th: 1
1988	42 - 71 (29 points)	30th: 0; 40th: 3; 50th: 8; 60th: 4; 70th: 1

In only one case, however, is the decline larger than 1 percentile point. The improvement scores range as high as +9 for one unit, with one at +8, one at +6, three at +5, one at +4, one at +3, one at +2, and two at +1.

Again, as in the 3rd grade profile, we find a general pattern of improvement among the pilot units, with the bottom units moving up steadily and rapidly. Two units lost ground in both 3rd and 6th grade. However, ten units experienced improvement in both 3rd and 6th grades over the period 1985-88. When the data in Tables 7 and 8 are examined, these patterns do not emerge.

Tables 7 and 8 present the achievement data for Grade 6 in the match units. The general level of achievement for this group starts out lower than for CDP units and declines over the period, unfortunately. While the ceiling remains constant at 63, the floor drops from the 37th percentile in 1986 to the 32nd in 1988. Moveover, more units fail to attain the median (50th percentile) in 1988 than in 1986 or 1987. Among individual units, 33% experience increases, two register no change over the period, and eight experience declines, with half of these experiencing declines of more than 5 percentile points. Of the five units with the lowest scores in 1986, two are worse off in 1988. Moreover, two units (L and G) begin the period in the 5th decile, but decline by 1988 to the 49th percentile. Of nine units scoring below the 50th percentile in 1988, fully two-thirds experienced declines over the period. Only two (H and O) improved their scores. The TPAS pilot experience, incidentally, appears to have had only mixed success. Two of the pilot units (I and J) experienced declines; two (O and K) made improvements and one (M) experienced no change.

As Table 8 demonstrates, the distance between the lowest and highest scoring units increased over the period, caused by the decline in the low performers.

TABLE 7

6rd Grade CAT Scores (Unit Average) for Match Units

1986		1987	1988
A*	63	A 67 (+ 4)	A 63 (- 4;N.C.)
C	63	C 62 (- 1)	C 62 (N.C.; +1)
L	56	E 61 (+ 7)	E 62 (+ 1;+ 8)
B	56	B 61 (+ 5)	B 58 (- 3;+ 2)
J*	55	J 56 (+ 1)	J 54 (- 2;- 1)
E	54	L 56 (N.C.)	K 50 (+ 6;+ 8)
G	52	G 55 (+ 3)	G 49 (- 6;- 3)
F	48	H 51 (+ 5)	L 49 (- 7;- 7)
D	48	F 47 (- 1)	H 48 (- 3;+ 2)
M*	47	D 46 (- 2)	M 47 (+ 6;N.C.)
H	46	K 44 (+ 2)	D 44 (- 2;- 4)
N*	43	M 41 (- 6)	F 42 (- 5;- 6)
K*	42	I 41 (+ 2)	O 41 (+10;+ 4)
I*	39	N 39 (- 4)	N 38 (- 1;- 5)
O*	37	O 31 (- 6)	I 32 (- 9;- 7)

* TPAS Pilot Units 1985-87

TABLE 8

Range and Decile Distributions of Match Units Per Year

	Range	Deciles : Units
1986	37 - 63 (26 points)	30th: 2; 40th: 6; 50th: 5; 60th: 2; 70th: 0
1987	31 - 67 (36 points)	30th: 2; 40th: 5; 50th: 4; 60th: 4; 70th: 0
1988	32 - 63 (31 points)	30th: 2; 40th: 7; 50th: 3; 60th: 3; 70th: 0

If any pattern emerges from this data, it is that the poor performers are performing more poorly at the end of the period. (See Figure 2). Of eight units below the median in 1986, four lose ground by 1988 and only one rises to the national median of 50. When the data in Table 7 are compared with those in Table 3, it becomes clear that Units E, K, and O experienced growth in both 3rd and 6th grade over the period. However, Units D, F, G, and I lost ground in both 3rd and 6th grades. Compare this with the ten units in the CDP group that improved both 3rd and 6th grade performance, while two experienced decline. Clearly, a very different pattern emerges whether the analysis is grade for grade, year for year, across the period, or for component units in the two groups.

Grade 8 Results

The data presented in Tables 9 and 10 concern 8th grade achievement in CDP pilot units. At first glance, they appear somewhat troublesome. For the first time, we see the range of difference in CDP units expanding, signifying that the ceiling is moving up faster than the floor or that the floor is actually dropping. However, a second look that considers only 15 of the 16 units is reassuring. The same patterns of achievement seen earlier are confirmed. While the Greene County data cannot be ignored, they seem to create a pattern of only one. The number of units scoring below the 50th percentile in 1988 is only half of those below the 50th in 1986. Moreover, of the four lowest scoring units in 1988, only Greene is actually losing ground and one unit is improving while two stay steady. Overall, ten units experienced score increases during the period, while three units declined. Five units experienced increases of +4 or better. Thus, improvement was generalized among high, medium, and low scoring units over the period. This is in marked contrast to the performance of 8th grade students in the 15 match units. Tables 11 and 12 present the data for these students.

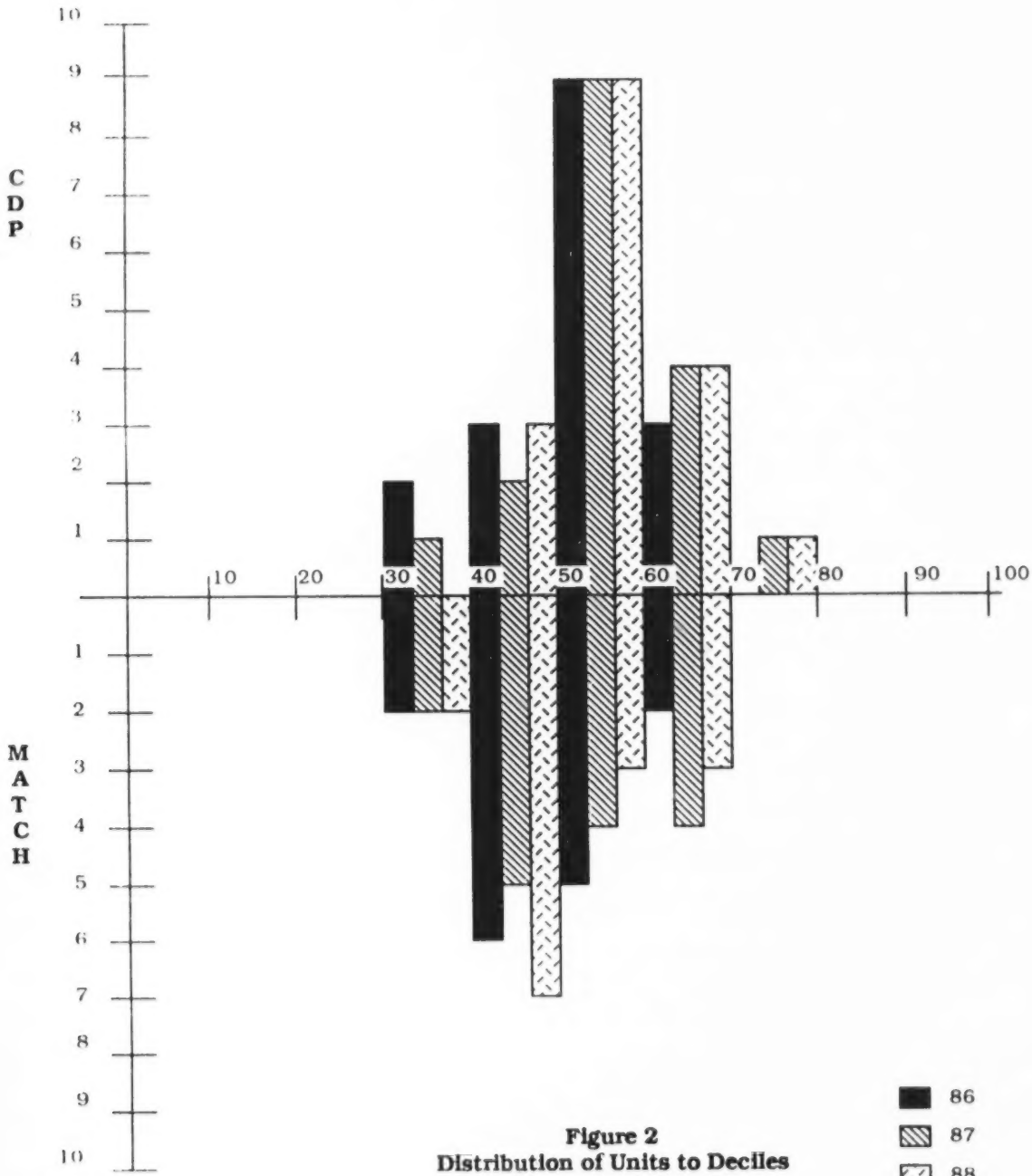


Figure 2
Distribution of Units to Deciles
6th Grade, 1986-88

TABLE 9

8th Grade CAT Scores (Unit Average) for CDP Units

1986		1987		1988	
R. Rapids	65	Burlington	64 (N.C.)	Burlington	68 (+ 4;+ 4)
Burlington	64	Haywood	62 (+ 1)	R. Rapids	65 (+ 4;N.C)
Haywood	61	Buncombe	62 (+ 4)	Haywood	62 (N.C.;+ 1)
Buncombe	58	R. Rapids	61 (- 4)	Chowan	57 (+10;+ 7)
Tarboro	54	N. Hanover	55 (+ 4)	N. Hanover	57 (+ 2;+ 6)
Salisbury	53	Perquimans	53 (+ 2)	Buncombe	56 (- 6;- 2)
Alexander	52	Montgomery	52 (+ 3)	Mecklenburg	55 (+ 4;+ 4)
Perquimans	51	Harnett	51 (+ 2)	Alexander	55 (+ 6;+ 3)
N. Hanover	51	Mecklenburg	51 (N.C.)	Salisbury	54 (+ 9;+ 1)
Mecklenburg	51	Burke	51 (+ 1)	Burke	53 (+ 2;+ 3)
Chowan	50	Orange	50 (+ 1)	Harnett	53 (+ 2;+ 4)
Burke	50	Alexander	49 (- 3)	Tarboro	52 (+ 3;- 2)
Montgomery	49	Tarboro	49 (- 5)	Orange	52 (+ 2;+ 3)
Harnett	49	Chowan	47 (- 3)	Perquimans	51 (- 2;N.C.)
Orange	49	Salisbury	45 (- 8)	Montgomery	49 (- 3;N.C.)
Greene	40	Greene	38 (- 2)	Greene	36 (- 2;- 4)

TABLE 10

Range and Decile Distributions of CDP Units Per Year

	Range	Deciles : Units
1986	40 - 65 (25 points)	30th: 0; 40th: 4; 50th: 9; 60th: 3; 70th: 0
1987	38 - 64 (26 points)	30th: 1; 40th: 4; 50th: 7; 60th: 4; 70th: 0
1988	36 - 68 (32 points)	30th: 1; 40th: 1; 50th: 11; 60th: 3; 70th: 0

Table 11 shows that both the group floor and ceilings rose over the period. In general, then, achievement improved for the group. Unfortunately, as many units failed to achieve at or above the national median in 1988 as in 1986, although four of these low- scoring units marked improvements over the period. For the most part, units below the median in 1986 were still there in 1988, with the notable exception of Units J and K, which changed places. Three of the top four units experienced improvement over the period while the midule units lost ground or showed no change.

Overall, these units did not do as well, relatively or absolutely, as did the CDP units (See Figure 3). The match group had a tighter range throughout the period as compared to the CDP units, partly because the match group's ceiling never equaled the CDP ceiling and because the match group's floor rose. However, the individual units did not do as well as the individual CDP units. Only eight of the matched units made improvements over the period, but four lost ground.

Overall Results

An overview of the net changes over the period at each grade level for each unit is provided in Table 13. While eight of the match units made gains in 3rd grade, 12 of the CDP units experienced improvements. At the 6th grade level, only one third of the match group made gains, while 11 of the CDP units improved. Among the match units, eight experienced gains in 8th grade compared with ten of the CDP units. Moreover, five CDP units -- Chowan, New Hanover, Salisbury, Burke and Burlington -- made gains at each grade level, while no unit lost at all levels. In the match units, E, K, and O experienced improvements at all levels. However, Units F and G experienced losses at each grade level.

TABLE 11

8th Grade CAT Scores (Unit Average) for Match Units

1986		1987	1988
C	59	B 58 (+ 3)	C 62 (+ 6;+ 3)
B	55	C 56 (- 3)	B 57 (- 1;+ 2)
G	55	G 55 (N.C.)	E 55 (+ 1;+ 1)
E	54	K 55 (+ 6)	G 53 (- 2;- 2)
A	53	E 54 (N.C.)	A 53 (+ 4;N.C.)
J*	52	J 53 (+ 1)	K 51 (- 4; +2)
H	51	L 52 (+ 3)	H 51 (+ 1;N.C.)
L	49	H 50 (- 1)	J 49 (- 4;- 3)
K*	49	A 49 (- 4)	L 47 (- 5;- 2)
M*	45	D 48 (+ 3)	M 46 (+ 2;+ 1)
F	45	M 44 (- 1)	O 46 (+ 9;+ 9)
D	45	N 41 (+ 1)	N 45 (+ 4;+ 5)
I*	40	I 37 (- 3)	D 45 (- 3;N.C.)
N*	40	F 37 (- 8)	F 44 (+ 7;- 1)
O*	37	O 37 (N.C.)	I 44 (+ 7;+ 4)

* Units participated in TPAs pilot 1985-87

TABLE 12

Range and Decile Distributions of Match Units Per Year

	Range	Deciles : Units
1986	37 - 59 (22 points)	30th: 1; 40th: 7; 50th: 7; 60th: 0; 70th: 0
1987	37 - 58 (21 points)	30th: 3; 40th: 4; 50th: 8; 60th: 0; 70th: 0
1988	44 - 62 (18 points)	30th: 0; 40th: 8; 50th: 6; 60th: 1; 70th: 0

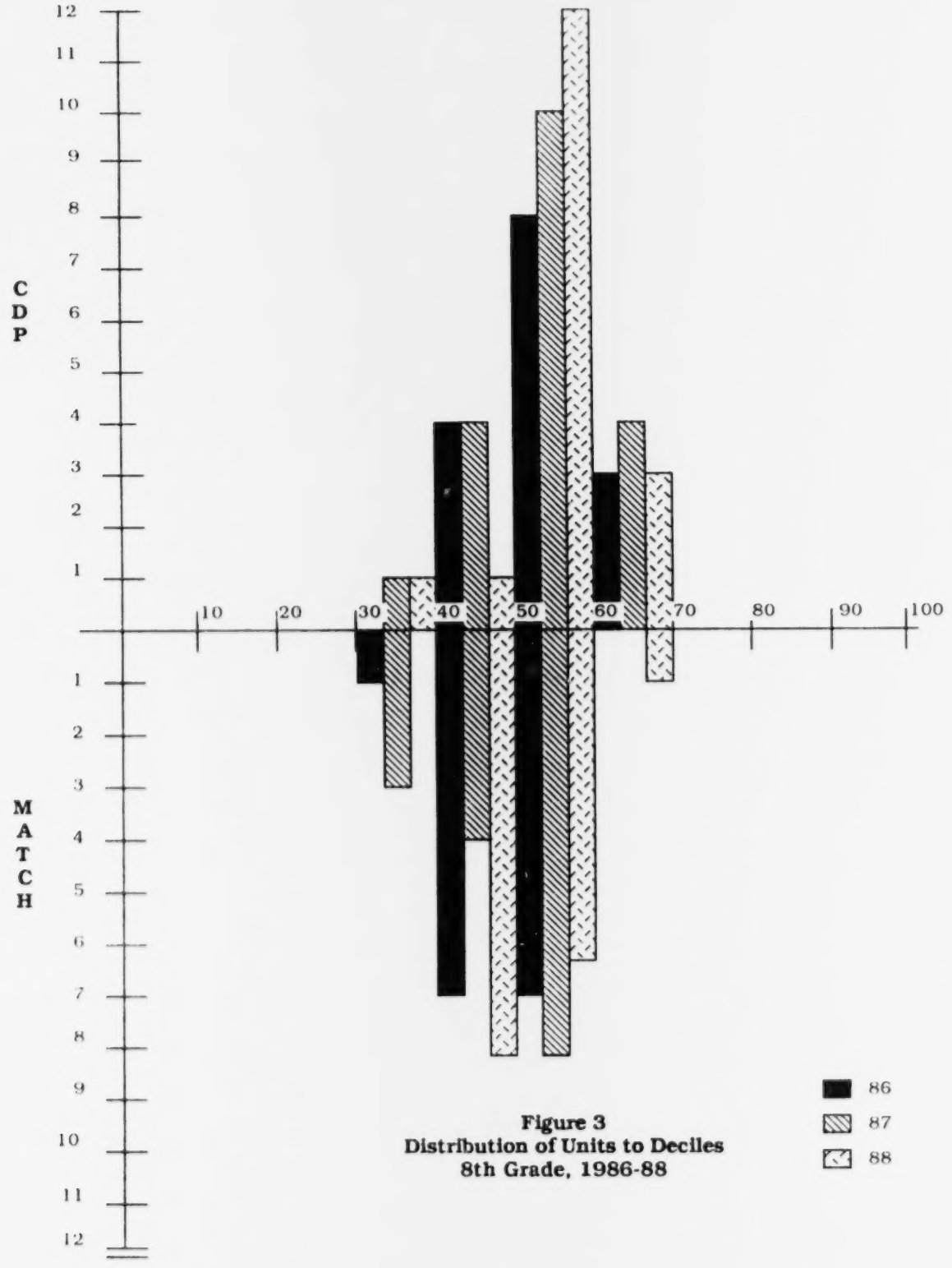


Figure 3
Distribution of Units to Deciles
8th Grade, 1986-88

TABLE 13

Overview of Change in 15 Match Units and 16 CDP Units

Unit \ Grade	3	6	8
A	-	NC	NC
B	-	+	+
C	+	-	+
D	-	-	NC
E	+	+	+
F	-	-	-
G	-	-	-
H	-	+	NC
I	-	-	+
J	+	-	-
K	+	+	+
L	+	-	-
M	+	NC	+
N	+	-	+
O	+	+	+
Total	8+	5+	8+
	7-	8-	4-
	ONC	2NC	3NC

Unit \ Grade	3	6	8
Perquimans	+	+	NC
Chowan	+	+	+
N. Hanover	+	+	+
Greene	+	+	-
Harnett	-	+	+
R. Rapids	-	-	NC
Tarboro	+	+	-
Montgomery	+	+	NC
Salisbury	+	+	+
Mecklenburg	-	-	+
Alexander	+	NC	+
Burke	+	+	+
Orange	+	-	+
Burlington	+	+	+
Haywood	NC	-	+
Buncombe	+	+	-
Total	12+	11+	10+
	3-	4-	3-
	1NC	1NC	3NC

\+ = improved in 1988 over 1986

\- = declined in 1988 over 1986

NC = No change in 1988 over 1986

When it is remembered that the match units were selected because of their resemblance to the CDP units on critical characteristics, the markedly different patterns are difficult to reconcile, unless the Career Development Program effect is taken into account. While it would be foolhardy to attribute all of the differences to CDP, it would be equally foolish to contend that CDP made no difference.

Clearly, patterns of improved student performance have been demonstrated in the CDP units both as a group and in many individual units. Moreover, the growth seems as likely to occur among high-performing units as in middling or low-performing units. This improvement appears to be as likely in 3rd or 6th grade as 8th grade. By contrast, we see no clearly defined patterns among the individual match units, although it could be argued that, as a group, the match units have experienced some improvement. This, of course, would reflect the general statewide improvement in CAT scores. This generalized improvement, however, is quite inconsistently demonstrated in the individual units, in contrast with the individual CDP units.

Student to Student Comparison

Before concluding the presentation of the CDP unit data in contrast to the match unit data, one more table should be presented. Table 14 presents the achievement data for 6th grade students in 1986 and the same data for the same students two years later, that is, 8th grade in 1988 for both groups of units.

In 1963, John B. Carroll published one of the most influential articles in the educational literature. (Carroll, 1963). In "A Model of School Learning", Carroll posited that students would learn as a function of aptitude, perseverance, opportunity, ability to learn, and quality of instruction.

While no one of these factors could overcome the others, the interaction was not clear, but obviously students will differ in aptitude and perseverance. Opportunity and quality of instruction, however, are more or less controllable by the institution. We would assume, then, that scores changes in the same population, over time, could reflect a change in opportunity to learn and/or quality of instruction. That is, if we compared scores of a student over time, some part of the difference should be attributable to quality of instruction.

Table 14 provides us with the opportunity to test the hypothesis with the units we have been considering. This table shows CAT scores (unit averages) for students in Grade 6 in 1986. It also shows CAT scores for essentially these same students two years later (1988) when they were in Grade 8. What do the data show?

First, let us consider only the CDP units. In 1986, five units (indicated by asterisk) had CAT averages below the 50th percentile. In 1988, only two units were below the 50th, and one of these was at 49th. Students in three units, then, had improved their scores enough to propel themselves over this line of demarcation. The neediest students, in short, performed better. Unfortunately, this pattern of improvement was not universal in the CDP units. Eight units declined between 6th and 8th grade. However, these losses were, by and large modest. Four units lost one percentile point, while three lost two points. One unit lost six points.

However, among the eight gaining units, the gains were significant. The smallest gain was three percentile points (experienced by four units), while other gains of four, five, six, and sixteen points were gained:

TABLE 14

Comparison of CAT Scores for 6th Grade (86) and 8th Grade (88) for CDP and Match Units

UNIT	6th Gr(86)	8th Gr(88)	Diff	UNIT	6th Gr(86)	8th Gr(88)	Diff
Burlington	69	68	-1	C	63	62	-1
Haywood	63	62	-1	A	63	53	-10
Roanoke Rapids	62	65	+3	L	56	47*	-9
Burke	59	53	-6	B	56	57	+1
N. Hanover	58	57	-1	J	55	49*	-6
Buncombe	58	56	-2	E	54	55	+1
Mecklenburg	57	55	-2	G	52	53	+1
Alexander	57	55	-2	F	48*	44*	-4
Chowan	54	57	+3	D	48*	45*	-3
Orange	53	52	-1	M	47*	46*	-1
Harnett	50	53	+3	H	46*	51	+5
Tarboro	48*	52	+4	N	43*	45*	+2
Perquimans	45*	51	+6	K	42*	51	+9
Montgomery	44*	49*	+5	I	39*	44*	+5
Salisbury	38*	54	+16	O	37*	46*	+9
Greene	33*	36*	+3				

* = Unit average below 50th percentile

Points	-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6	+16
Units	1	0	0	0	3	4	0	0	0	4	1	1	1	1

In short, the gainers improved more than the losers lost. Moreover, among the lower half of the units (arranged by 6th grade scores) only one lost ground. Children who had done well in 6th grade continued to do well and children who had done relatively poorly in 6th grade made remarkable growth.

Now, let us turn to the right side of the table. The picture here is somewhat different. Notice that in 1986, eight units (F, D, M, H, N, K, I, and O) all scored below the 50th percentile, in Grade 6. In 1988, eight units were still below the 50th percentile. However, only Units H and K had moved from below to above the 50th percentile. Units F, D, M, N, I, and O were still below the median, although three of them (N, I, and O) had improved. Unfortunately, F, D, and M had actually declined further. More unfortunately, Units L and J had also fallen below the median, going from 56th and 55th to 47th and 49th respectively. While the very neediest students had improved their scores, in some cases dramatically, many of the "near needy" had declined markedly. The trend for marginal units (those near, but below the median) was clearly down from the median.

Moreover, among the seven top-scoring units in 1988, (the only ones above the median in 1986), four had lost ground as compared to themselves when in Grade 6. The losses were not small. While the highest scoring district had lost only 1 point, the other units lost 10, 9, and 6 percentile points.

The only gains in the top seven were one percentile point each in three units:

Points	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
Units	1	1	0	0	1	0	1	1	0	2	0	3	1	0	0	2	0	0	0	2	0

It must not be overlooked that the five lowest-scoring sixth grades all made improvement, repeating the pattern seen among CDP's lowest scoring units. Their growth, however, was not as rapid or as large as the growth of the CDP units, while the losing units tended to lose more than the losing CDP units. Clearly, the comparison favors CDP, indicating that sustained growth occurred in the majority of these units with relatively modest losses.

Considering all of the data presented in Tables 1-14, what conclusions may be drawn? These data show that:

- among CDP units, in Grades 3, 6, and 8, the number scoring below the 50th percentile declined over the period 1986-88. In 1988, only 1 unit was below the median in Grade 3, 3 in Grade 6, and 2 in Grade 8. By contrast, 3 of the match units were below the 50th percentile, down from 4. Nine units were below the median in 6th grade in 1988, up from 8. In 8th grade there was no change in absolute numbers, with 8 units below the national average.
- In Grades 3 and 6, CDP units raised the floor from the 43rd and 33rd percentiles to the 47th and 42nd percentile, respectively.

While the floor for 8th grade fell from the 40th to the 36th percentile, if we discount a single unit, the floor stayed steady at the 49th percentile over the period.

In the match units, the floor rose in Grades 3 and 8, but fell in Grade 6, with two units experiencing declines.

Similarly, the ceilings rose in each grade among CDP units, but rose in the match units' 3rd and 8th grades.

- More than 63% of the CDP units experienced growth in each grade over the period. Between 33% and 50% of the match units improved at each grade level.
- Decreases of scores over the period was much more likely to occur among units in the match set.
- If we compare 1986 6th grades to 1988 8th grades, we see the largest gains among the neediest units. However, units of the match set were more likely to lose, and to lose more, than units in the CDP set.
- Finally, no CDP unit experienced declines in all three grades over the period. In the match units, two units experienced losses in each grade. Among the CDP set, five units made gains in each grade. In the match set, only two units equalled their achievement.

CDP Units Within Regions

One more type of analysis may increase our understanding of the performance of students in Career Development Program pilot units. It will be interesting to compare the units with the performance of the units comprising the educational regions in which they fall. In this way, we will be able to look at the CDP units in the context of their region to see whether patterns of improvement of student achievement appear.

Table 15 a, b, and c present a picture of 3rd grade achievement in all eight educational regions. The letters "x" or "o" have been arbitrarily assigned to the CDP pilots in each region. While the interaction of the three tables contains much interesting information, we note only some of this. Generally, the performance improved in all regions over the period in question. However, the relative position of many of the pilot units, especially if they were on the lower side, improves more rapidly. Since the line represents the continuum of performance in the region, careful attention should be paid to movement of the end bars and to the x's and o's. Obviously, at 3rd grade, the CDP units improved absolutely and relatively. While some of the units moved more rapidly than others, most moved to the right of the line, the desired direction.

Tables 16 a, b, and c present the 6th grade data in the same format. It is interesting to note that, over time, the two units in the same region might exchange places, but generally both continue moving right. Presumably, this indicates accelerated rates of change in one unit compared to another. This phenomenon is most clearly seen in Regions VII and VIII.

Finally, Tables 17 a, b, and c present information about 8th grade performance in the units and regions from 1985-88. Some change in the ranges, in both directions, is visible indicating that some units are improving scores, while others are declining. However, the general upward movement pattern of the CDP units, individually and as a group, remains distinct.

Thus, compared with their regions, the CDP units students generally performed so that their improvements were marked, relative to others in the region. The pattern holds over time at all grade levels.

TABLE 15 a
1986: 3rd Grade CAT % iles

REGIONS/CDP UNITS

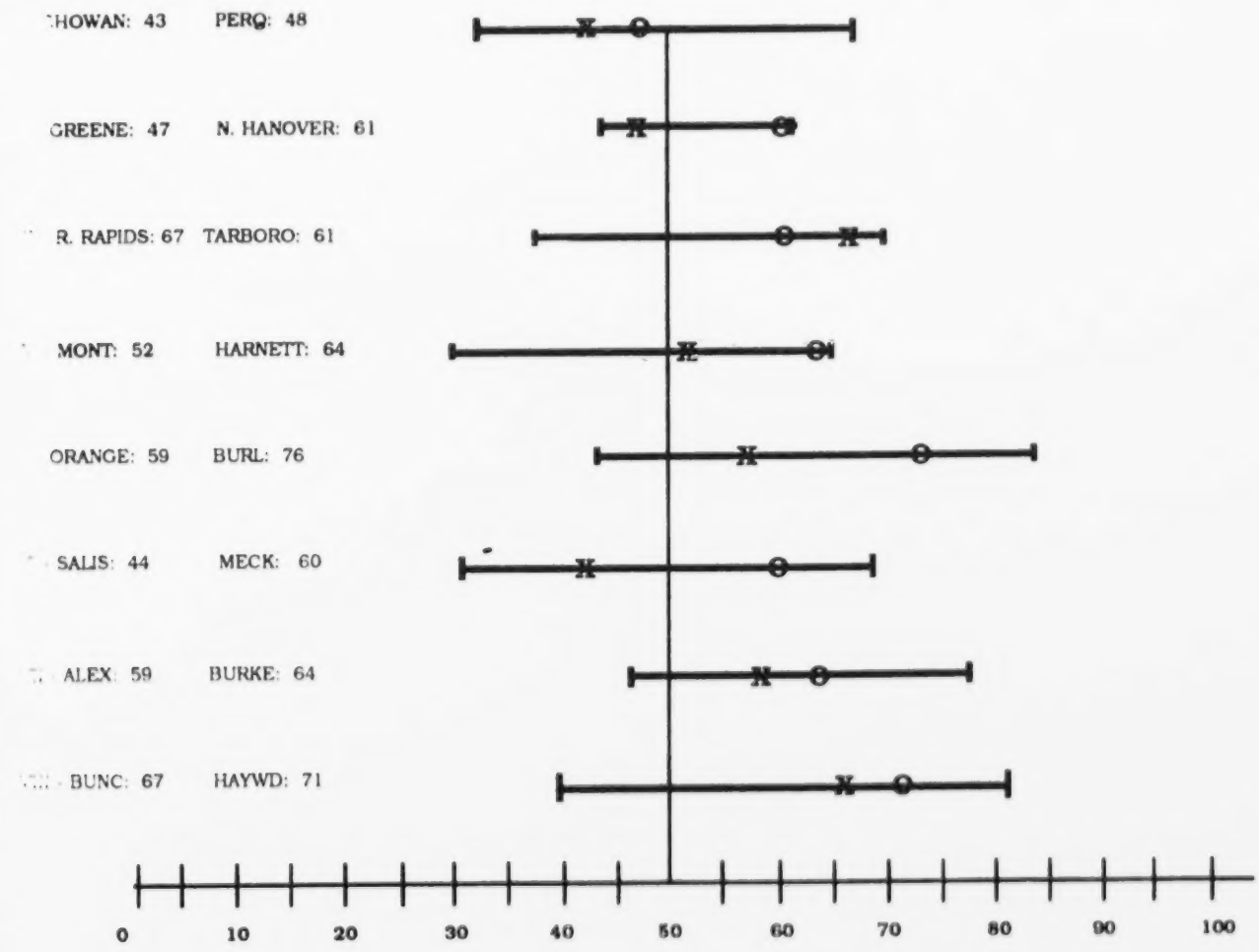


TABLE 15 b
1987: 3rd Grade CAT % iles

REGIONS/CDP UNITS

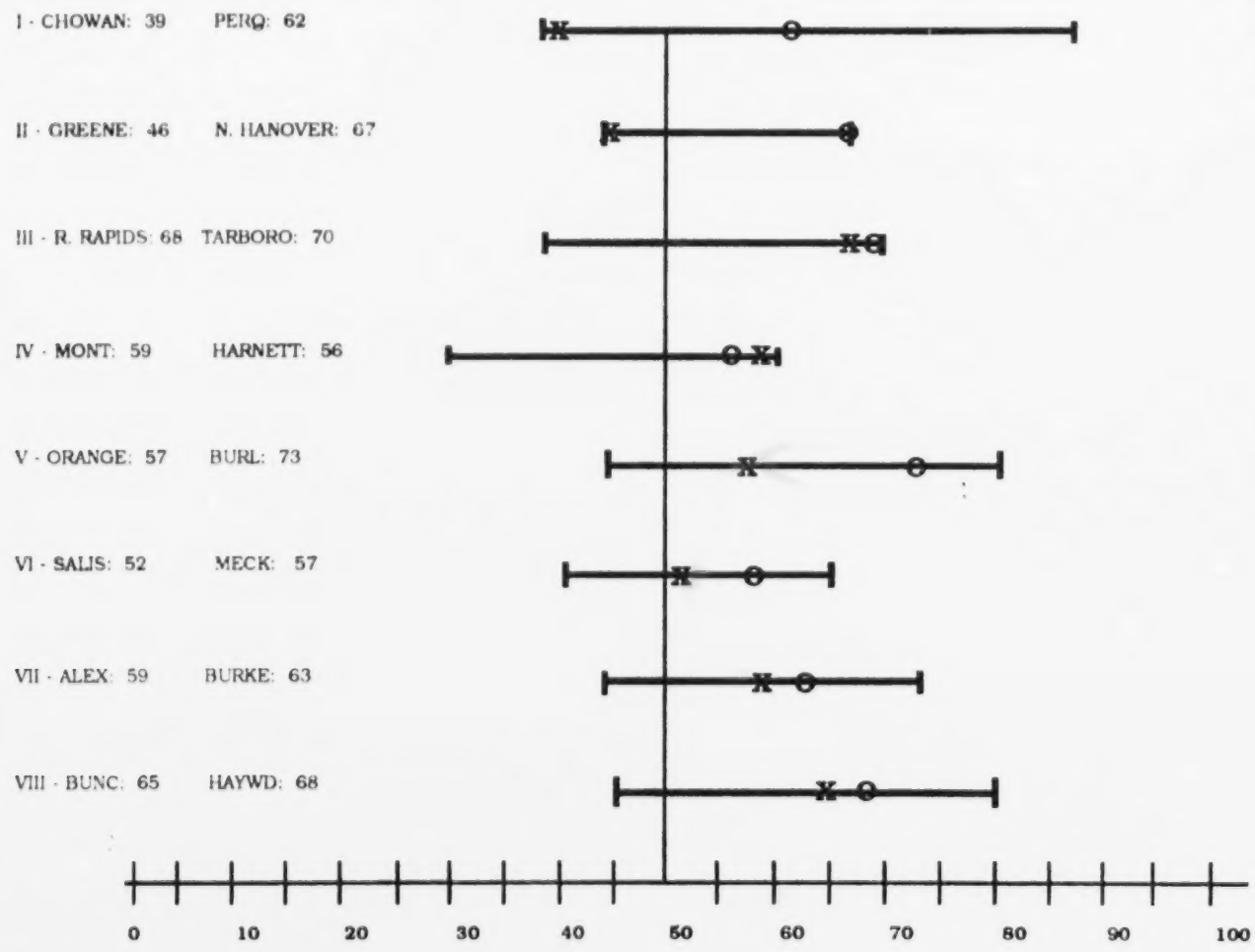


TABLE 15 c
1988: 3rd Grade CAT % iles

REGIONS/CDP UNITS

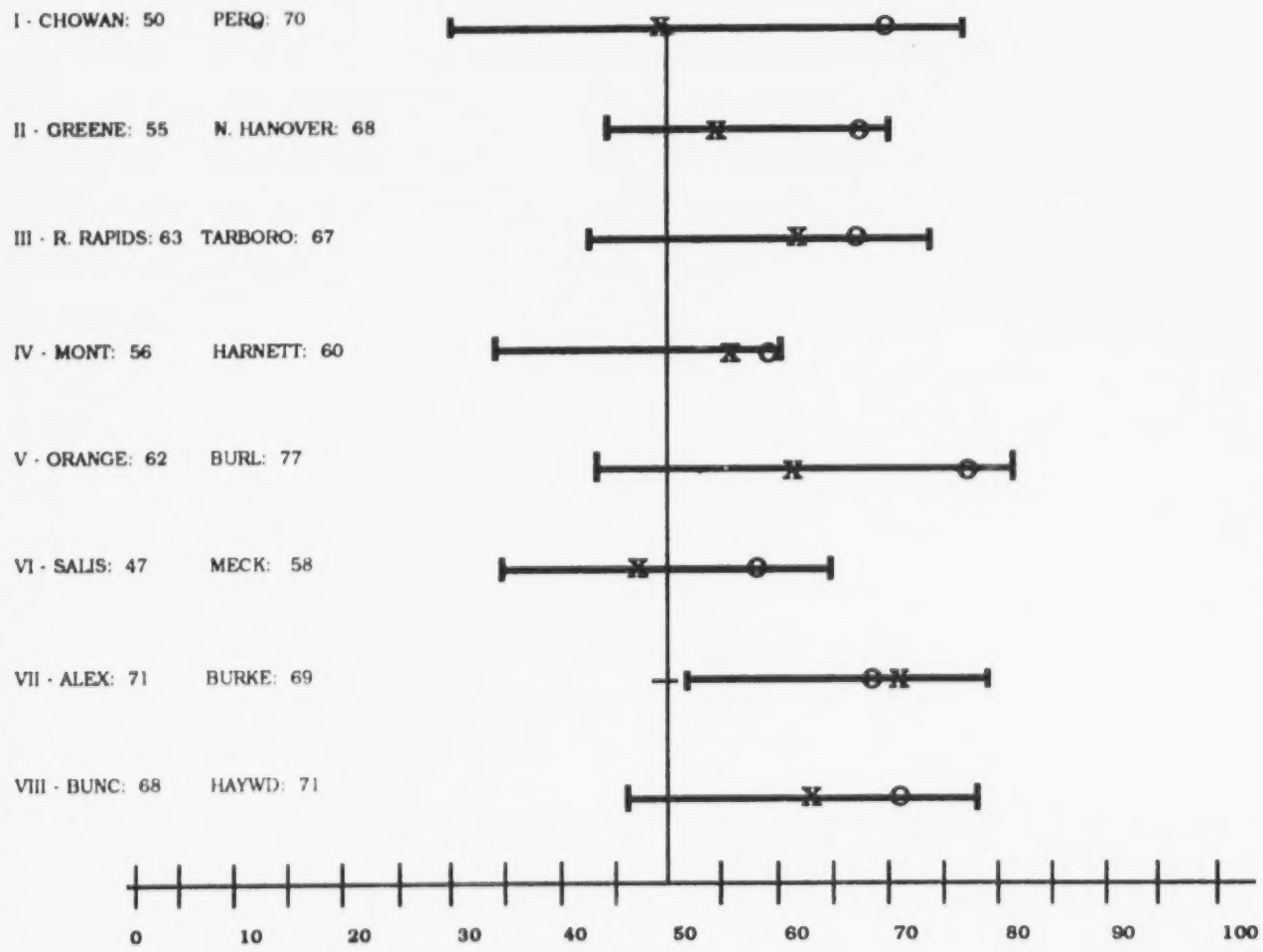


TABLE 16 a
1986: 6th Grade CAT % iles

REGIONS/CDP UNITS

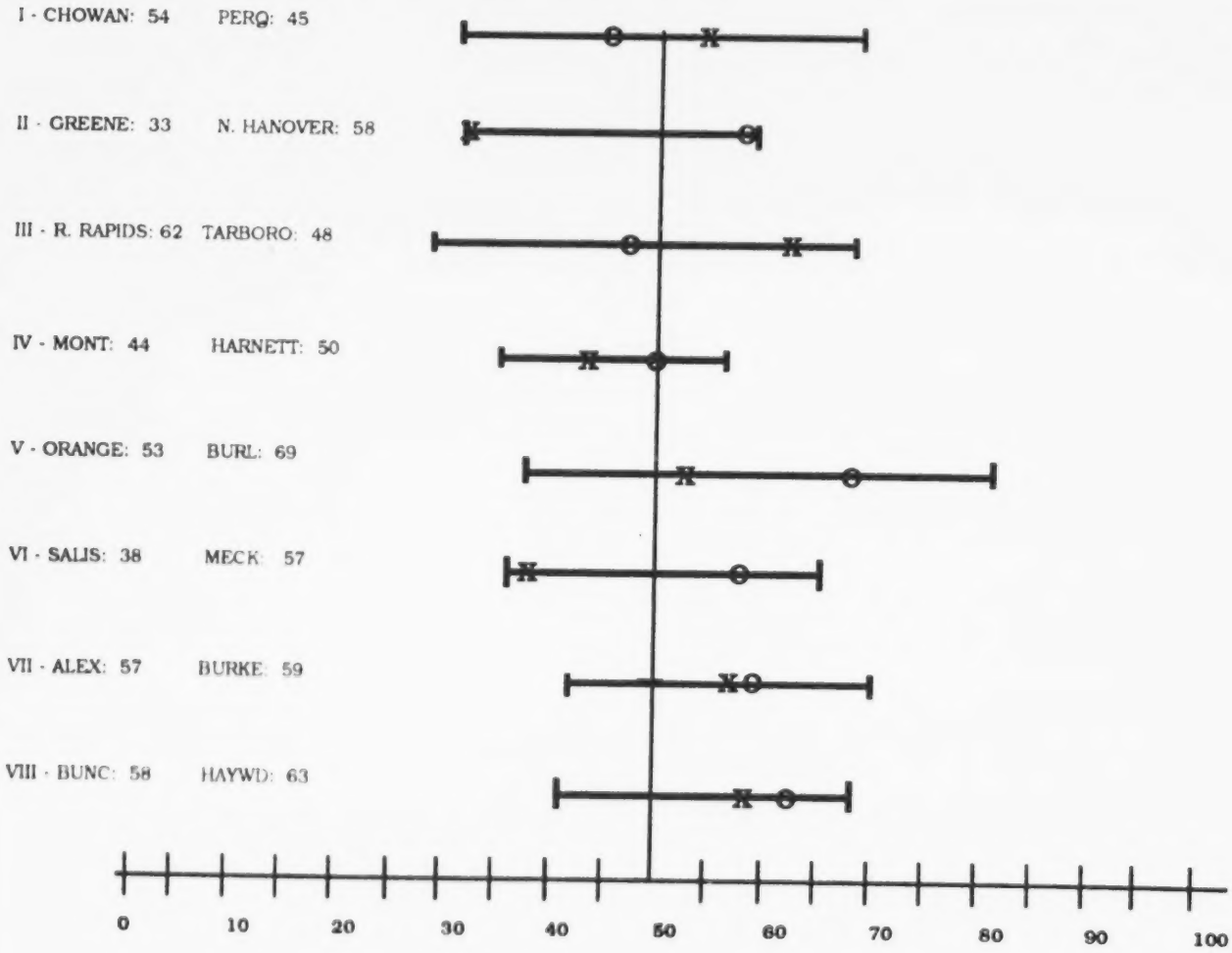


TABLE 16 b
1987: 6th Grade CAT % iles

REGIONS/CDP UNITS

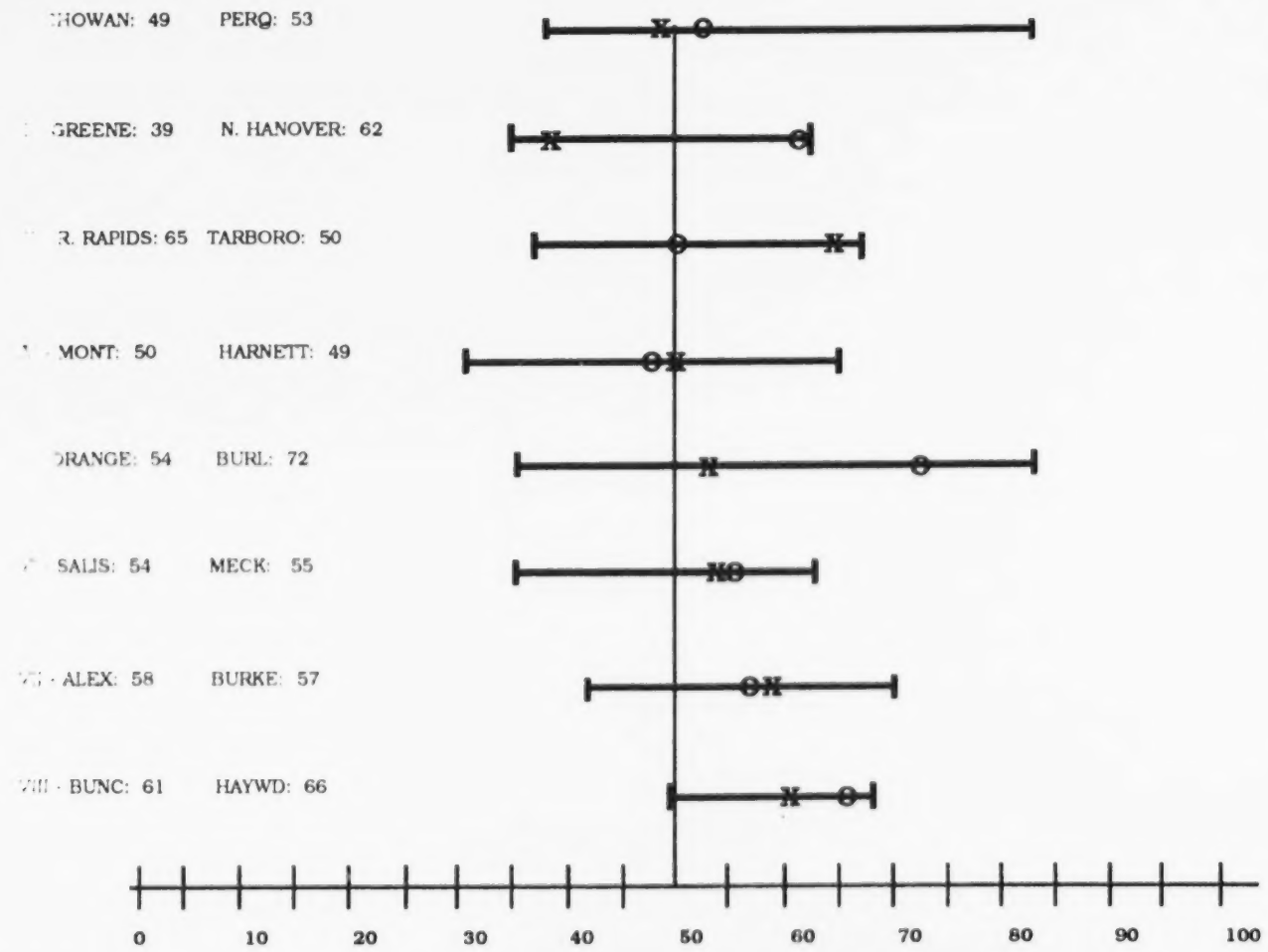


TABLE 16 c
1988: 6th Grade CAT % iles

REGIONS/CDP UNITS

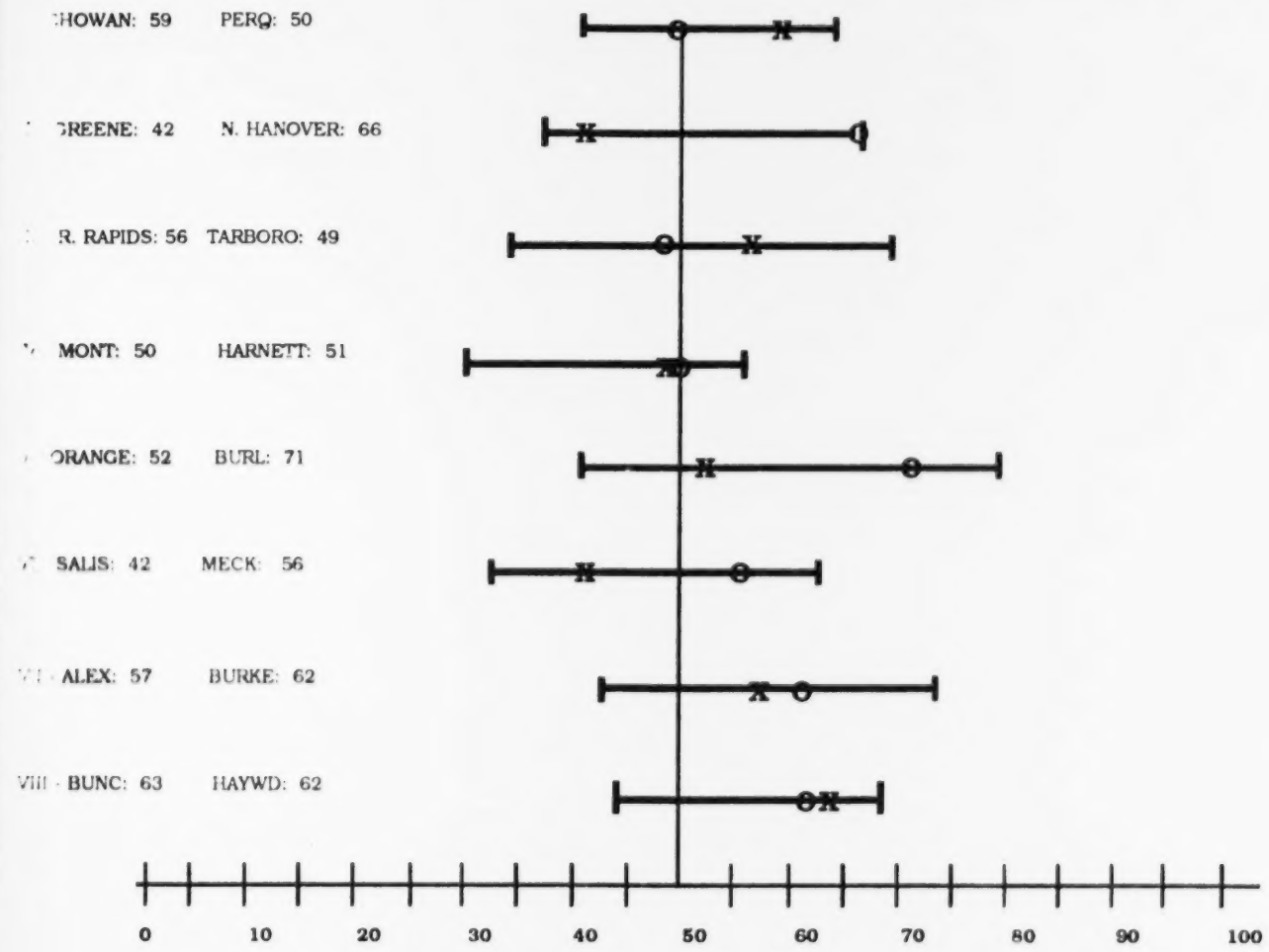


TABLE 17 a
1986: 8th Grade CAT % iles

REGIONS/CDP UNITS

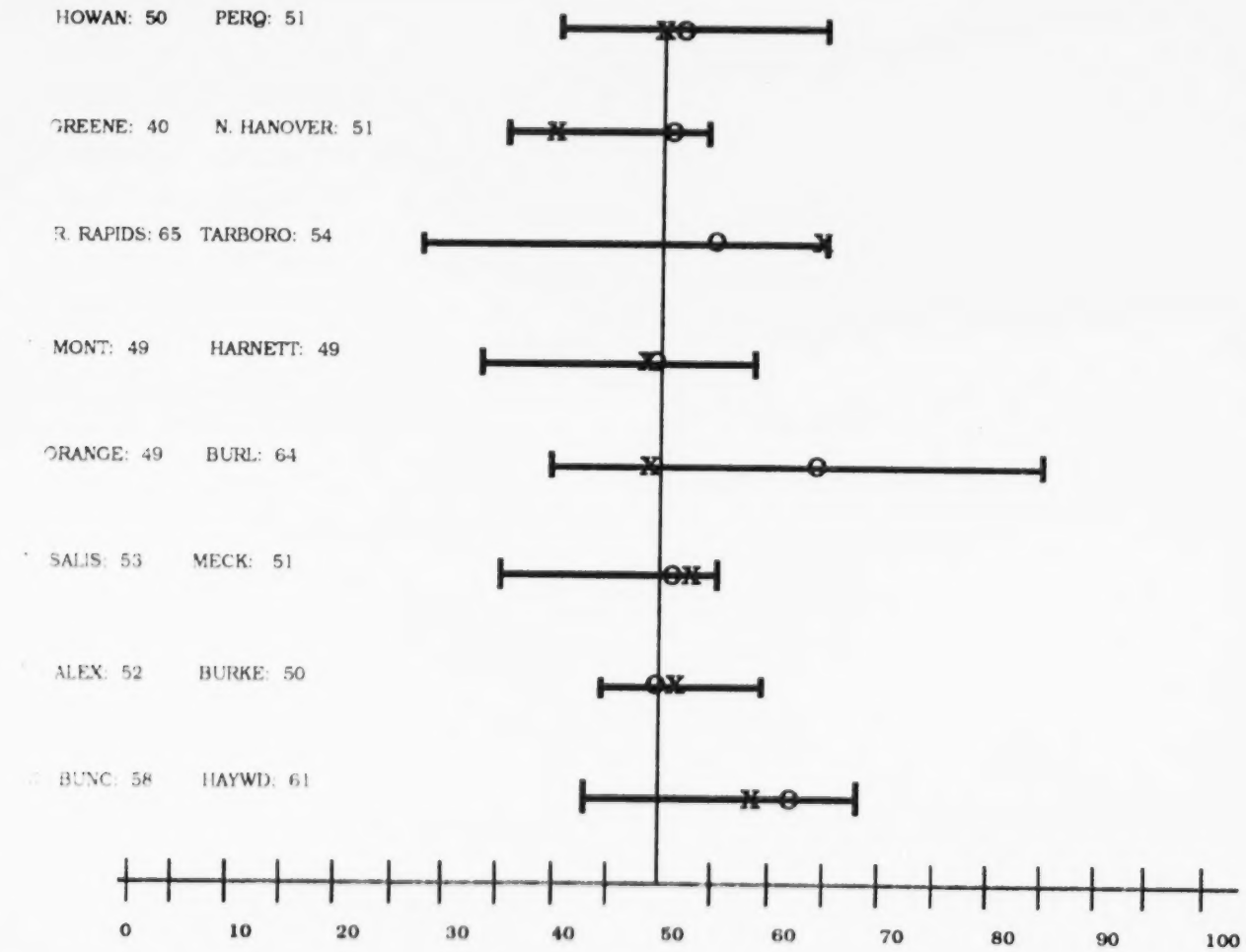


TABLE 17 b
1987: 8th Grade CAT % iles

REGIONS/CDP UNITS

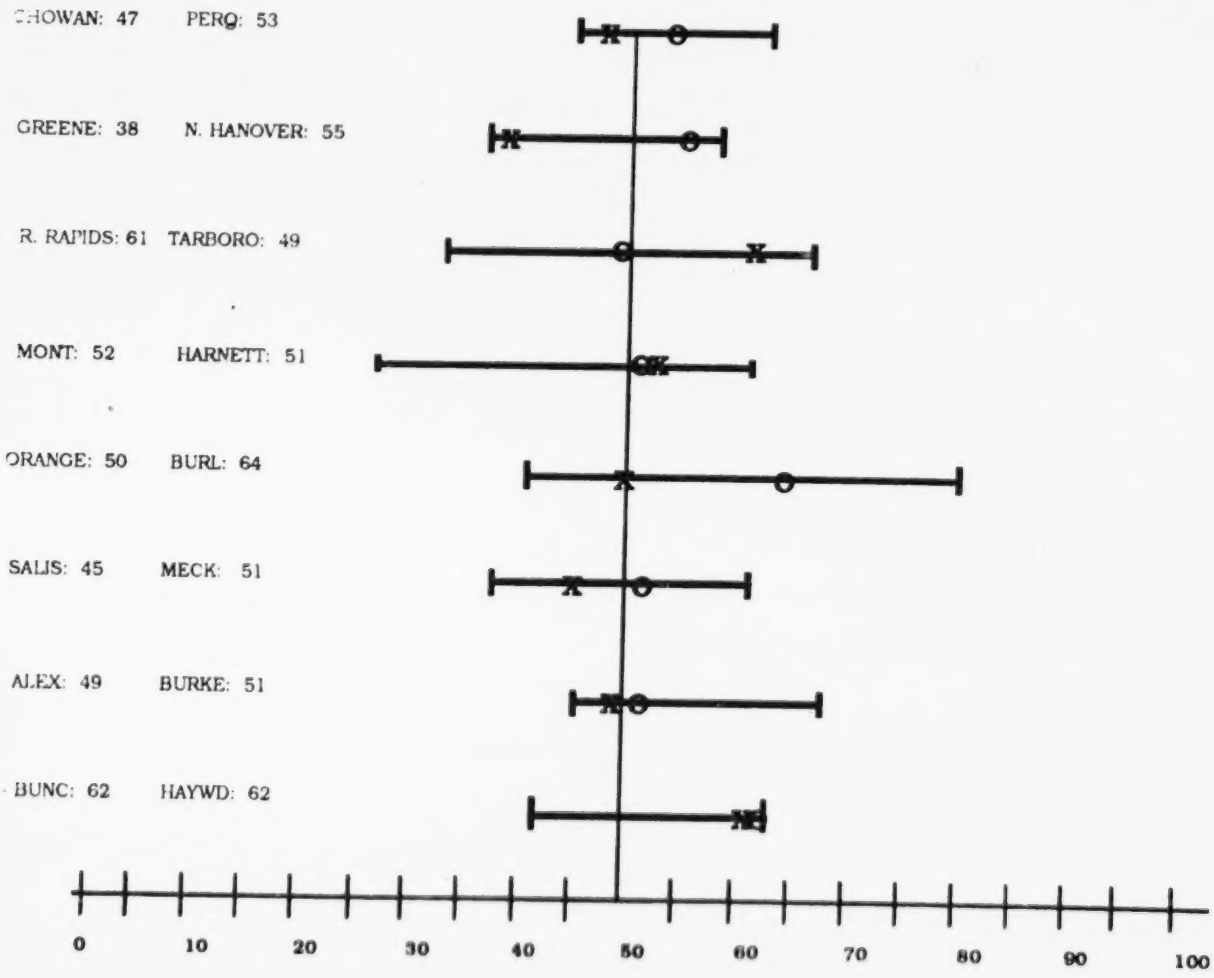
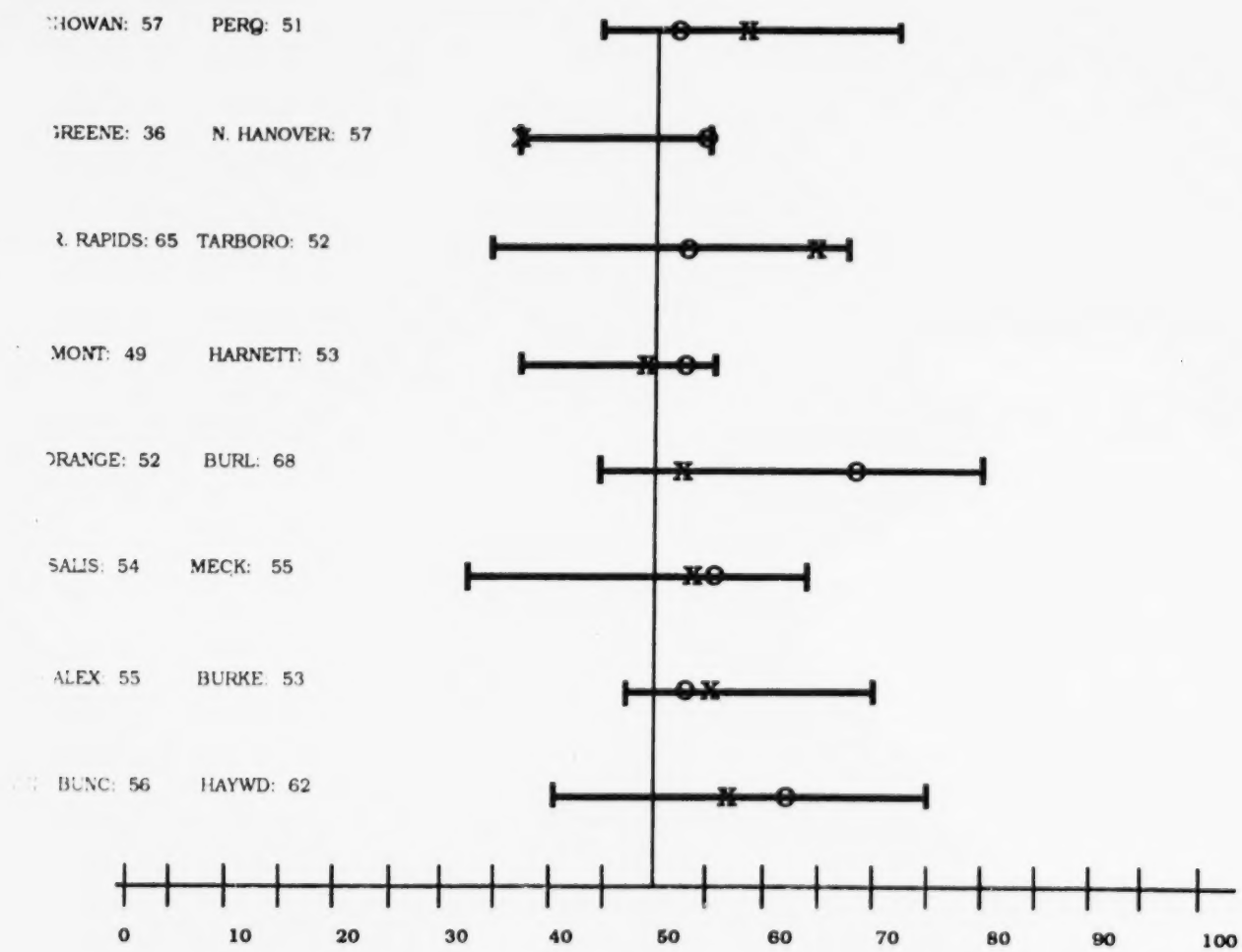


TABLE 17 c
1988: 8th Grade CAT % iles

REGIONS/CDP UNITS



CONCLUSION

It is clear from the preceding analysis that, as Larry Lazotte has said, school units are either improving or declining. When student achievement in the Career Development Program pilot units is examined the general tendency is towards improvement. Fewer CDP units scored below the national median for third grade in 1988 than did in 1986. The same was true for 6th and 8th grade achievement. In the group of match units, we did see a decline of units scoring below the median in grade 3, but we saw no improvement on this parameter in Grades 6 or 8.

In general, CDP units, for the most part, experienced improvement over the period in Grades 3, 6, and 8. In Grade 3, 13 CDP units improved or showed no change. In Grade 6, 12 of the CDP units improved or showed no change. In Grade 8, 13 CDP units improved or showed no change. The corresponding numbers for the match group were eight units for Grade 3, seven units for Grade 6, and ten for Grade 8.

If we focus our attention on the four lowest performing units in each group, we find that, in the CDP units, the lowest performers all made improvements in Grades 3 and 6, while one unit gained, one lost, and two stayed the same in Grade 8. By contrast, in the match set, only two units improved in Grade 3 over the period, while two lost. In Grade 6, one unit improved while three lost. In Grade 8, two units improved, one remained unchanged, and one unit lost.

At the upper end of the scale, the two groups were more similar. In 3rd grade, three of the top four CDP units improved and one unit remained unchanged. In the match group, for third grade, three units improved, while one lost ground. In Grade 6, all four top performing CDP units made improvement, while two of the match units improved, one remained unchanged, and one lost. In Grade 8, we see exactly the same pattern in both groups that were seen in Grade 3.

As Table 13 shows, improvement was more likely to occur in the CDP units than in the matched set. If we think of each grade per unit as a measurement opportunity, the CDP units as a group improved on 69% of the measures, stayed unchanged on 10%, and declined on 21% of the measures. The matches' corresponding rates were 47% improvements, 11% no change, and 42% decline. Whereas clear patterns of improvement are demonstrated by the CDP units, we would characterize the change in the match units as random improvement or diffused change. While it is unreasonable to credit all the improvement experienced in the CDP units to their efforts in the pilot, certainly some of the improvement should be credited to the pilot. It is important to remember that these analyses were undertaken precisely because of the almost universal sentiment among CDP participants that instruction had improved because of the unit's participation in the pilot.

Perhaps the most interesting demonstration of CDP's efficacy is presented in Table 14. Remember that these scores were posted by largely the same population at the beginning of the CDP experience and two years later. Both the direction, location, and amount of improvement are heartening. All of the units scoring below the national median in 1986 showed sizeable improvements. While the decreases in the high-and middle-scoring units is cause for concern, the relatively small decreases, with one exception, do not obviate the benefits of the CDP.

By contrast, in the match units, while the lowest performing units do make commendable gains, the relatively larger, more wide-spread losses among the other units is noteworthy. Again, the random nature of the change offers confirmation that quite different conditions obtained in this group from the CDP group.

It has been seriously suggested that students would suffer because of a perceived necessity for "robotized" teaching in the CDP units. These data put the lie to that charge. Clearly, students in the CDPs, taken as a group, have benefitted from more wide-spread good teaching than did students in the match sample. While we cannot factor out how much of the achievement gains to credit with specific feature of Career Development or other innovations, for that matter, it is clear that the sixteen participating units have posted significant gains in student achievement, in both relative and absolute terms.

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